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Feedback from the wheat community: the case of the WheatIS

Michael Alaux

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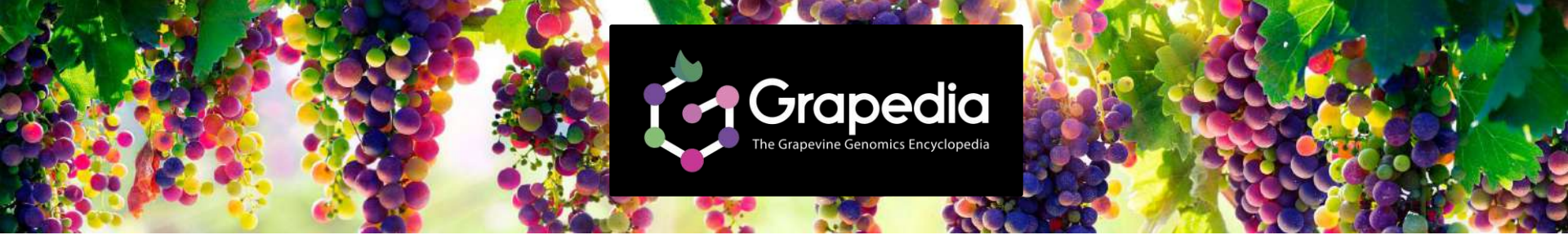
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Feedback from the wheat community: the case of the WheatIS



Michael Alaux, 23 November 2022



Outline

- ❑ The Wheat Initiative
- ❑ The WheatIS Expert Working Group
- ❑ Data standards
- ❑ Data discovery

The Wheat Initiative



<https://www.wheatinitiative.org>

Background

- ❑ Proposed by research and funding organisations from several countries
- ❑ Endorsed by the G20 Agricultural Ministers to contribute to improving world food security
- ❑ Launched on 15 September 2011



Challenges and vision

- ❑ The world wheat production is not meeting the necessary future demand:
 - food demand will increase by 60% by 2050, while yields are stagnating
 - wheat is particularly susceptible to climate change.

- ❑ Support the development of a global wheat public-private research community sharing resources, data, knowledge to improve wheat productivity, quality and sustainable production around the world.

Strategic Research Agenda



Open Access Feature Paper Review

Meeting the Challenges Facing Wheat Production: The Strategic Research Agenda of the Global Wheat Initiative

by Peter Langridge ^{1,2,*} Michael Alaux ³, Nuno Felipe Almeida ⁴ Karim Ammar ⁵, Michael Baum ⁶, Faouzi Bekkaoui ⁷, Alison R. Bentley ⁵ Brian L. Beres ⁸ Bettina Berger ⁹ Hans-Joachim Braun ⁵, Gina Brown-Guedira ¹⁰ Christopher James Burt ¹¹, Mario Jose Caccamo ¹² Luigi Cattivelli ¹³ Gilles Charmet ¹⁴, Peter Civián ¹⁴, Sylvie Cloutier ¹⁵ Jean-Pierre Cohan ¹⁶, Pierre J. Devaux ¹⁷ Fiona M. Doohan ¹⁸, + Show full author list

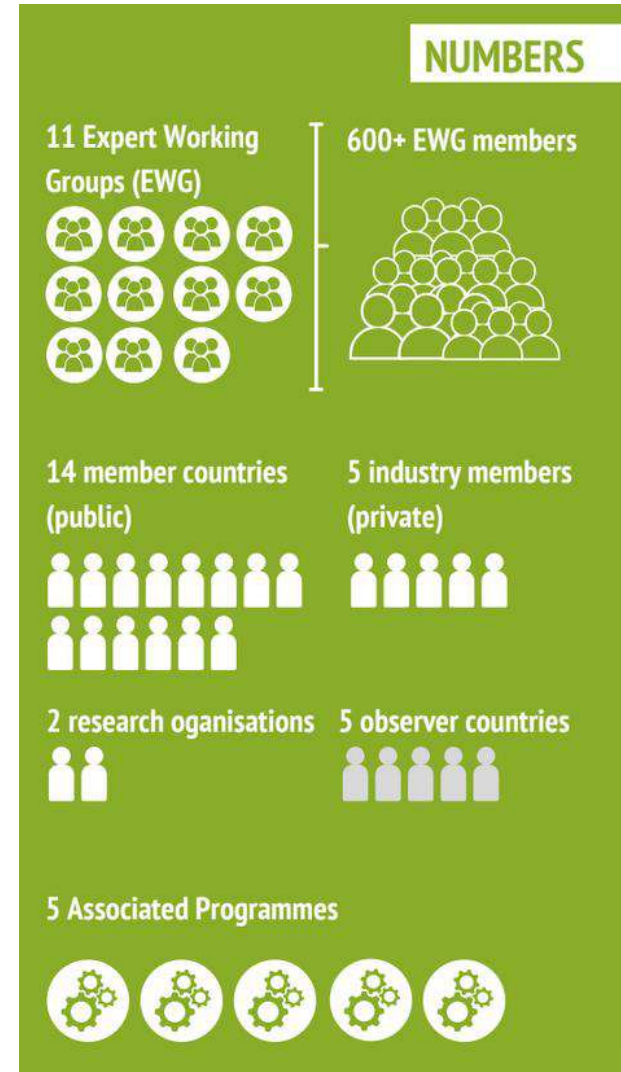
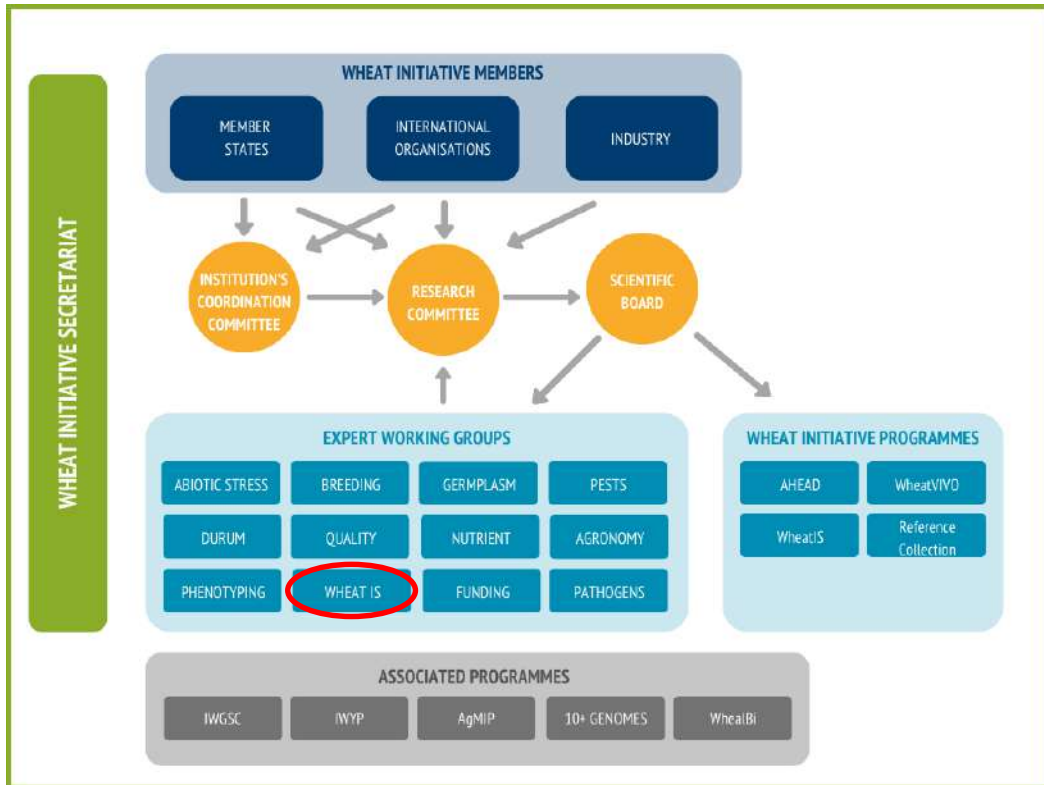
- ¹ School of Agriculture, Food and Wine, Waite Campus, University of Adelaide, PMB1, Glen Osmond, SA 5064, Australia
 - ² Wheat Initiative, JKI (Julius Kühn Institute), Federal Research Centre for Cultivated Plants, 14195 Berlin, Germany
 - ³ INRAE, URGI, Université Paris-Saclay, 78026 Versailles, France
 - ⁴ ASUR Plant Breeding, 60190 Estrées-Saint-Denis, France
 - ⁵ CIMMYT (International Maize and Wheat Improvement Center), Texcoco 56237, Mexico
 - ⁶ ICARDA (International Center for Agricultural Research in the Dry Areas), Rabat 10106, Morocco
 - ⁷ INRA (National Institute for Agricultural Research), Rabat 10090, Morocco
 - ⁸ AAFC (Agriculture & Agri-Food Canada), Lethbridge Research and Development Centre, Lethbridge, AB T1J 4B1, Canada
 - ⁹ Australian Plant Phenomics Facility, School of Agriculture, Food and Wine, University of Adelaide, Urrbrae, SA 5064, Australia
 - ¹⁰ USDA-ARS (United States Department of Agriculture—Agricultural Research Service), Plant Science Research, Raleigh, NC 27695, USA
- + Show full affiliation list
- * Author to whom correspondence should be addressed.

Agronomy **2022**, *12*(11), 2767; <https://doi.org/10.3390/agronomy12112767>

Received: 26 September 2022 / Revised: 28 October 2022 / Accepted: 29 October 2022 /
Published: 7 November 2022

<https://doi.org/10.3390/agronomy12112767>

Organisation



The Wheat Information System Expert Working Group




<http://www.wheatis.org/>

Community


- ❑ Building an expert working group
- ❑ Seeking help from other communities (RDA)
- ❑ Surveys
- ❑ Fundings for meetings
- ❑ A successful result
- ❑ Outreach

OPINION ARTICLE Check for updates

Building a successful international research community through data sharing: The case of the Wheat Information System (WheatIS) [version 1; peer review: 2 approved, 1 approved with reservations]

Taner Z. Sen¹, Mario Caccamo², David Edwards³,  Hadi Quesneville^{4,5}

[Author details](#)

 This article is included in the [Agriculture, Food and Nutrition gateway](#).

Abstract

The International Wheat Information System (WheatIS) Expert Working Group (EWG) was initiated in 2012 under the Wheat Initiative with a broad range of contributing organizations. The mission of the WheatIS EWG was to create an informational infrastructure, establish data standards, and build a single portal that allows search, retrieval, and display of globally distributed wheat data sets that are indexed in standard data formats at servers around the world. The web portal at [WheatIS.org](#) was released publicly in 2015, and by 2020, it expanded to 8 geographically-distributed nodes and around 20 organizations under its umbrella.

In this paper, we present our experience, the challenges we faced, and the answer we brought for establishing an international research community to build an informational infrastructure. Our hope is that our experience with building [wheatis.org](#) will guide current and future research communities to facilitate institutional and international challenges to create global tools and resources to help their respective scientific communities.

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Website

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WheatIS



About

This project aims at building an International Wheat Information System, called hereafter WheatIS, to support the wheat research community. The main objective is to provide a single-access web base system to access to the available data resources and bioinformatics tools.

This project is based on the principles listed below:

- Collective building of the WheatIS to better respond to the needs of the international wheat community;
- Incremental implementation to offer rapidly an operational information system;
- Emphasis on Quality Assurance to serve as a framework for an approach with incremental implementation;
- Promotion of an open-access model for data exchange;
- Reliance on a distributed system;
- Use of Virtual Machine and Cloud Computing technologies to facilitate sharing data and tools;
- Promotion of the visibility of each participating platform to contribute to their sustainability.

If you have questions regarding this Wheat Information System project, please contact: wheatis-contact@wheatis.org

Help desk: If you have questions regarding this Wheat Information System project, please contact: wheatis-contact@wheatis.org

[Tweets by @WheatIS](#)



<http://www.wheatis.org/>

Data standards



RDA Wheat Data Interoperability Working Group

❑ Building on existing standards and practices

❑ Converging towards the recommendations

❑ Dissemination

- Website
- Agroportal for wheat ontologies

❑ Adoption



OPINION ARTICLE Check for updates

REVISED Developing data interoperability using standards: A wheat community use case [version 2; peer review: 2 approved]

Esther Dzale Yeumo¹, Michael Alaux^{1b 2}, Elizabeth Arnaud³, Sophie Aubin¹, Ute Baumann⁴, Patrice Buche⁵, Laurel Cooper^{1b 6}, Hanna Ćwiek-Kupczyńska⁷, Robert P. Davey^{1b 6}, Richard Allan Fulss⁸, Clement Jonquet^{1b 10,11}, Marie-Angélique Laporte³, Pierre Larmande^{1b 12,13}, Cyril Pommier^{1b 2}, Vassilis Protonotarios^{1b 14}, Carmen Reverte^{1b 15}, Rosemary Shrestha⁹, Imma Subirats^{1b}, Aravind Venkatesan^{1b 12}, Alex Whan¹⁷,  Hadi Quesneville^{1b 2}

[Author details](#)

 This article is included in the **Agriculture, Food and Nutrition gateway**.

Abstract

In this article, we present a joint effort of the wheat research community, along with data and ontology experts, to develop wheat data interoperability guidelines. Interoperability is the ability of two or more systems and devices to cooperate and exchange data, and interpret that shared information. Interoperability is a growing concern to the wheat scientific community, and agriculture in general, as the need to interpret the deluge of data obtained through high-throughput technologies grows. Agreeing on common data formats, metadata, and vocabulary standards is an important step to obtain the required data interoperability level in order to add value by encouraging data sharing, and subsequently facilitate the extraction of new information from existing and new datasets. During a period of more than 18 months, the RDA Wheat Data Interoperability Working Group (WDI-WG) surveyed the wheat research community about the use of data standards, then discussed and selected a set of recommendations based on consensual criteria. The recommendations promote standards for data types identified by the wheat research community as the most important for the coming years: nucleotide sequence variants, genome annotations, phenotypes, germplasm data, gene expression experiments, and physical maps. For each of these data types, the guidelines recommend best practices in terms of use of data formats, metadata standards and ontologies. In addition to the best practices, the guidelines provide examples of tools and implementations that are likely to facilitate the adoption of the recommendations. To maximize the adoption of the recommendations, the WDI-WG used a community-driven approach that involved the wheat research community from the start, took into account their needs and practices, and provided them with a framework to keep the recommendations up to date. We also report this approach's potential to be generalizable to other (agricultural) domains.

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<https://doi.org/10.12688/f1000research.12234.2>

Website

Wheat Data Interoperability Guidelines

Home Guidelines ▾ Ontologies & Vocabularies Use cases ▾ Getting involved About ▾

Guidelines

Under the submenus of this section you will find information on the best practices, tools, recommendations and examples to create, manage and share data related to Wheat. It includes subsections for each of the following data types: What are currently the most used and relevant vocabularies in the context of Wheat Initiative?

Sequ
Geno
Phen
Germ
Gene
Phys

From December 2014 to January 2015 the editorial team conducted a survey "Towards a Comprehensive Overview of Ontologies and Vocabularies for Research on Wheat". The objective was to collect information about the visibility, interoperability, domain, content and other technical aspects of relevant ontologies and vocabularies. As a result, in February 2015 a report ([link](#)) was published, and also a list of vocabularies listed as follows:

Exempl

1. AGROVOC
2. Biorefinery
3. CAB Thesaurus (CABT)
4. Cell Ontology (CL)
5. Chemical Entities of Biological Interest (ChEBI)
6. Crop Ontology (CO)
7. Crop Research Ontology – part of Crop Ontology (CO_715)
8. Environment Ontology (ENVO)
9. Experimental Factor Ontology (EFO)
10. Feature Annotation Location Description Ontology (FALDO)
11. NAL Thesaurus (NALT)
12. Phenotype And Trait Ontology (PAIO)
13. Plant Experimental Conditions Ontology (Plant Environment Ontology, EO, may be changing to PECO)

Welcome

These recommendations have been prepared by members of the [Wheat Data Interoperability Working Group](#) (WG), one of the WGs of the Research Data Alliance and the only WG of the [Agriculture Data Interoperability Interest Group](#). The group is coordinated by members of the [Wheat Initiative](#), a global initiative that aims to reinforce synergies between bread and durum wheat national and international research programmes to increase food security, nutritional value and safety while taking into account societal demands for sustainable and resilient agricultural production systems. All the standards and databases presented in these recommendations are referenced into the [FAIRshanng](#) website.

More specifically, the WG aims to:



Promote the adoption of common standards, vocabularies and best practices for Wheat data management



Facilitate access, discovery and reuse of wheat data



Facilitate wheat data integration

Links

FAIRshari

Use cases

Click on the titles for details

1. [QUERY ON TRIAL DATA ASSOCIATED WITH VARIETIES](#)
2. [DECIPHER THE EFFECT OF SNPS](#)
3. [IDENTIFICATION OF WHEAT GENES THAT CONTROL ROOT GROWTH](#)
4. [QUERY DATA BY GERMPASM/GENOTYPE](#)
5. [QUERY PHENOTYPE TRIALS TO BUILD INTEGRATIVE DATASET FOR PHENOTYPE OR GENETIC ANALYSIS.](#)
6. [QUERY ON GERMPASM WITH SPECIFIC TRAITS](#)

<https://ist.blogs.inrae.fr/wdi/>

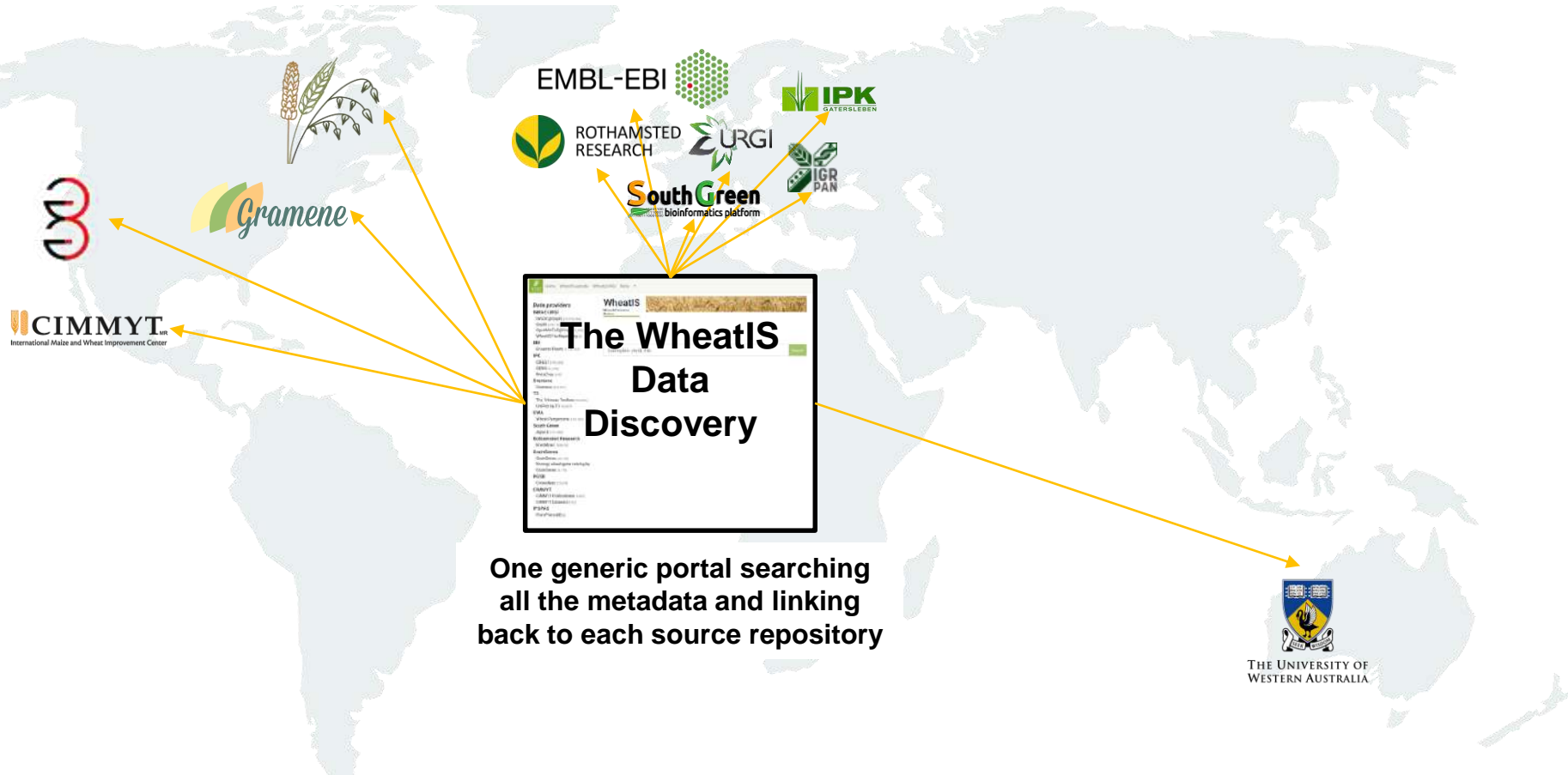
Data discovery



The screenshot shows the WheatIS DataDiscovery web interface. At the top, there is a navigation bar with the 'wheatIS' logo (WHEAT INFORMATION SYSTEM) on the left, a 'WHEAT INITIATIVE' logo in the center, and a hamburger menu icon on the right. Below the navigation bar is a banner image of a wheat field. The main heading 'WheatIS' is displayed in a large font, with 'DataDiscovery' underneath it. A search bar contains the text 'Exemples : yield, fhb' and an orange 'Rechercher' button.

<https://urgi.versailles.inrae.fr/wheatis>

Federated data portal



Repositories

INRAE-URGI

IWGSC@GnpIS [19 195 264]

GnpIS [631 498]

brapi@INRAE-URGI [15 949]

OpenMinTeD@GnpIS [1 692]

WheatIS File Repository [6]

EBI

Ensembl Plants [3 071 189]

IPK

CR-EST [199 220]

GEBIS [51 820]

MetaCrop [355]

Gramene

Gramene [229 851]

T3

The Triticeae Toolbox [206 406]

UniProt by T3 [16 607]

UWA

Wheat Pangenome [167 167]

Rothamsted Research

KnetMiner [108 474]

GrainGenes

GrainGenes [20 190]

Komugi wheat gene catalog by

GrainGenes [3 119]

PGSB

CrowsNest [13 324]

CIMMYT

CIMMYT Publications [1 600]

CIMMYT Datasets [183]

EVA

brapi@EVA [710]

TERRA-REF

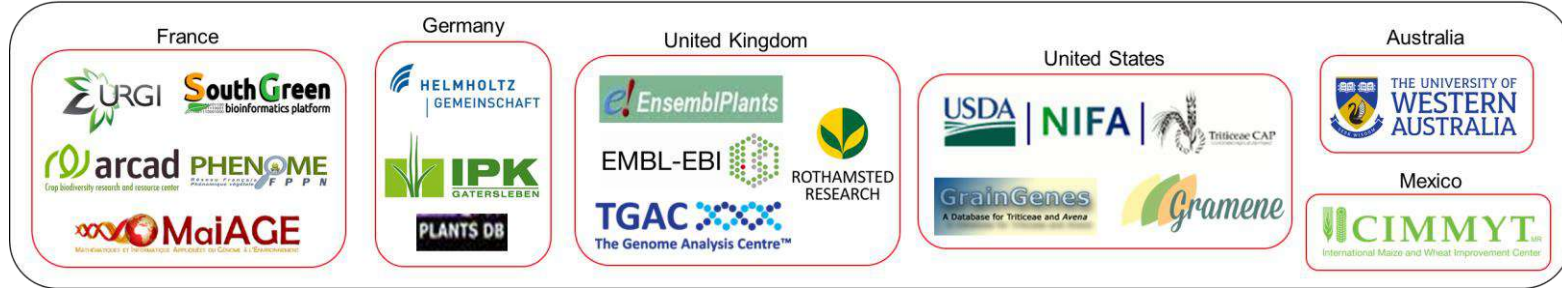
brapi@TERRA-REF [284]

IPGPAS

PlantPhenoDB [6]

Behind the scene

International Network

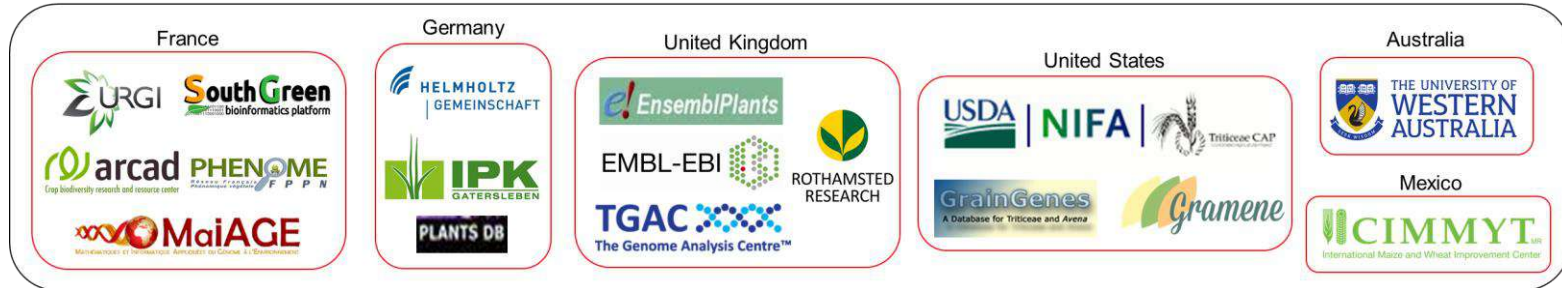


Multiple Data Sources

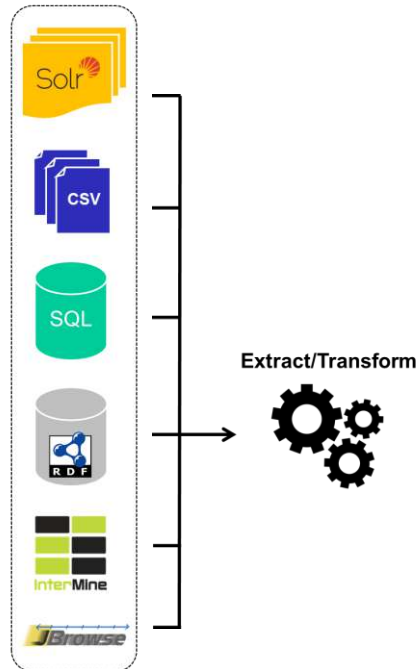


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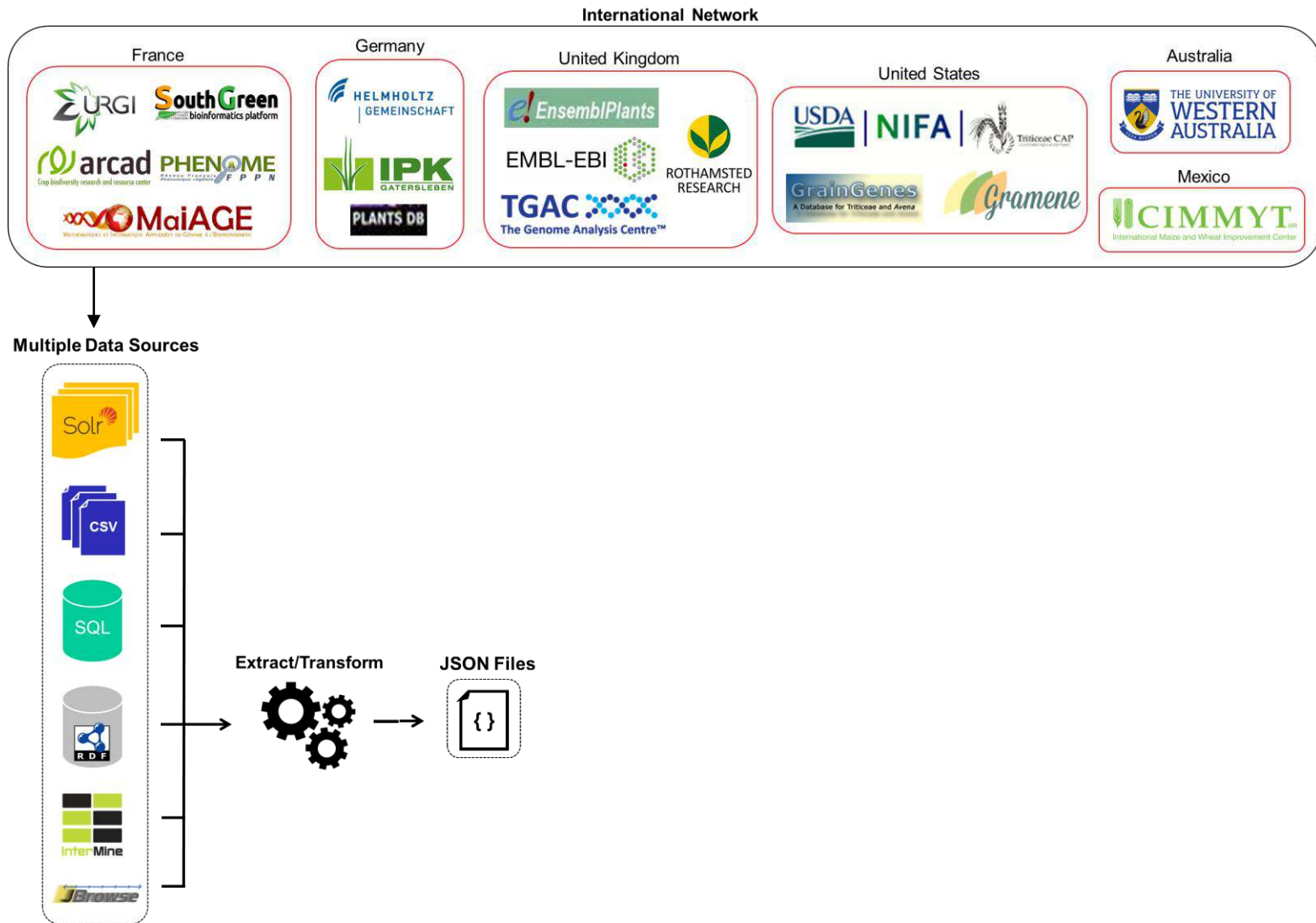
International Network



Multiple Data Sources

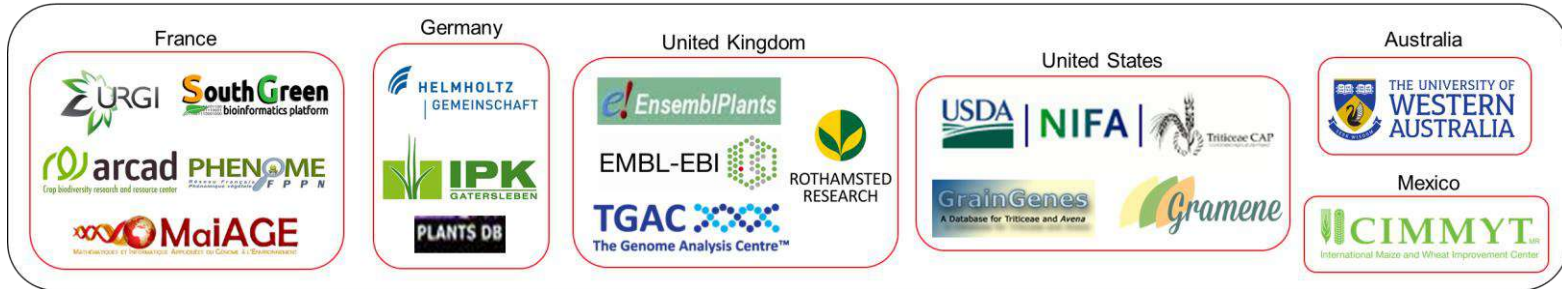


Behind the scene



Behind the scene

International Network



Multiple Data Sources



```
{  
  "entryType": "Bibliography",  
  "node": "CIMMYT",  
  "databaseName": "CIMMYT Publications",  
  "description": "Genetic analysis and mapping ..",  
  "url": "http://hdl.handle.net/10883/2969",  
  "species": [  
    "Septoria tritici blotch",  
    "Triticum aestivum l.",  
    "Wheat"  
  ],  
  "name": "10883/2969"  
}
```

Extract/Transform

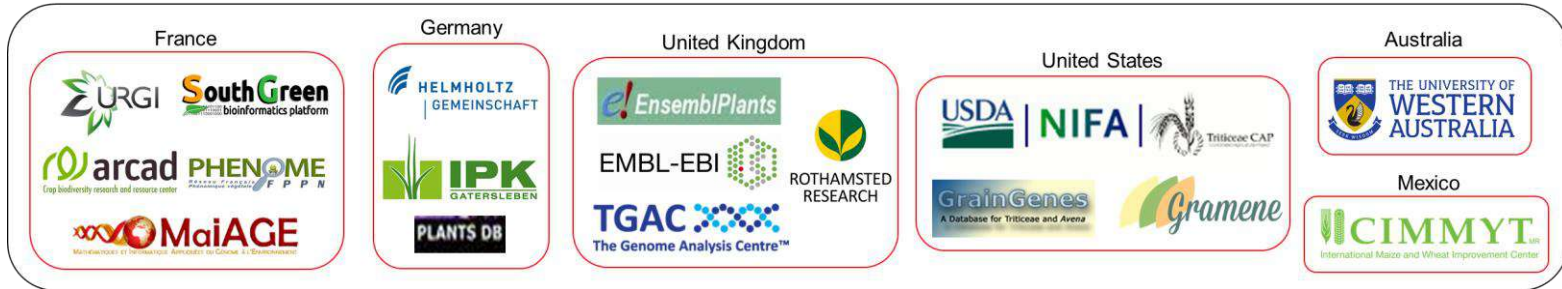


JSON Files



Behind the scene

International Network



Multiple Data Sources



Simple data model

```
{  
  "entryType": "Bibliography",  
  "node": "CIMMYT",  
  "databaseName": "CIMMYT Publications",  
  "description": "Genetic analysis and mapping...",  
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    "Wheat"  
  ],  
  "name": "10883/2009"  
}
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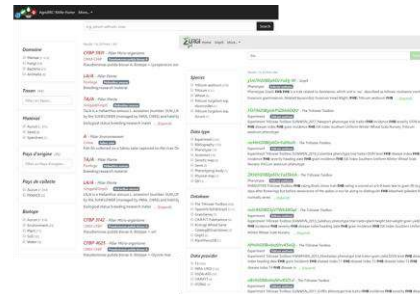
Extract/Transform



JSON Files

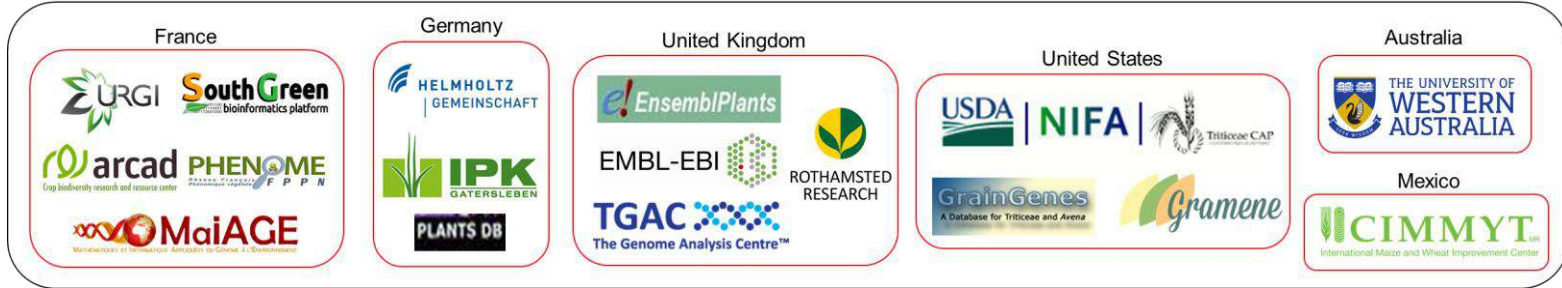


Centralized index

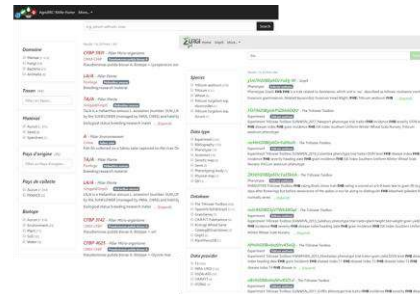
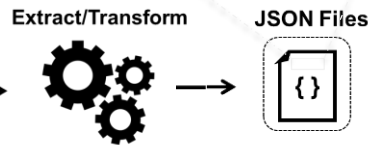
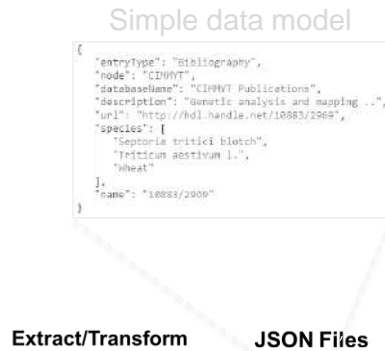
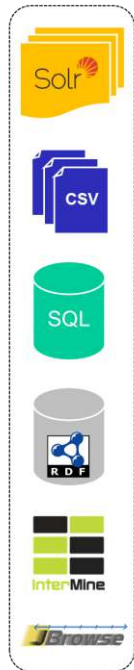


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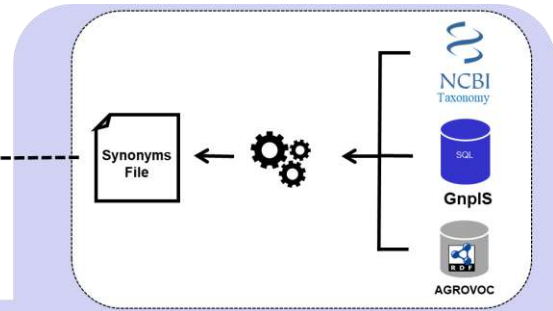
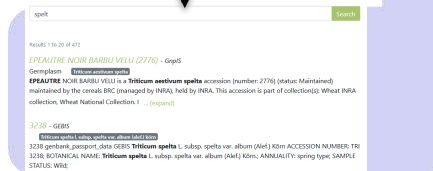
International Network



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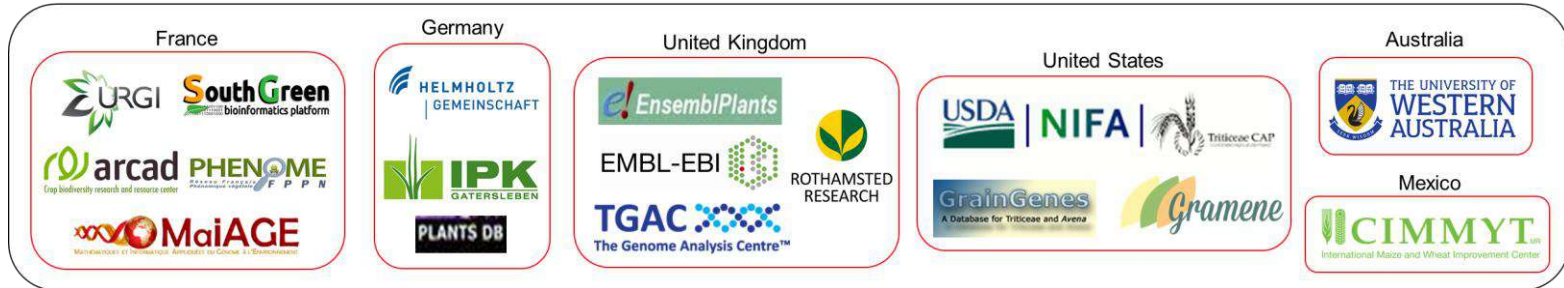
Centralized index



Synonyms Enrichment System

Behind the scene

International Network



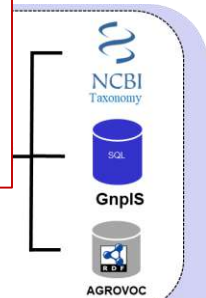
Multiple Data Sources



Extract/Tr



elasticsearch



Synonyms Enrichment System





Data exchange format

Field

- name
- url
- description
- entryType
- species
- node
- databaseName

Status

- mandatory
- mandatory
- mandatory
- mandatory
- mandatory
- mandatory
- mandatory

Cardinality

- 1
- 1
- 1
- 1
- 1-*
- 1
- 1

Constraints

- unique
- none
- none
- cf. list in doc, recom.
- cf. Species list below
- same for all a dataset
- none

- WheatIS species list: Aegilops*, Hordeum*, Triticum*, Wheat*
- Format: JSON or TSV, as you wish!
- Web server: HTTP or FTP, as you wish!
- The up-to-date format is always available at <https://urgi.versailles.inrae.fr/wheatis/join>



WheatIS

Wheat Information System

Data providers

INRAE-URGI

- [IWGSC@GnpIS](#) [19,195,264]
- [GnpIS](#) [642,142]
- [OpenMinTeD@GnpIS](#) [1,589]
- [WheatIS File Repository](#) [6]

EBI

- [Ensembl Plants](#) [1,168,762]

IPK

- [CR-EST](#) [199,220]
- [GEBIS](#) [51,302]
- [MetaCrop](#) [355]

Gramene

- [Gramene](#) [229,851]

T3

- [The Triticeae Toolbox](#) [206,406]
- [UniProt by T3](#) [16,607]

UWA

- [Wheat Pangenome](#) [167,167]

South Green

- [AgroLD](#) [137,060]

Rothamsted Research

- [KnetMiner](#) [108,474]

GrainGenes

- [GrainGenes](#) [20,190]
- [Komugi wheat gene catalog by GrainGenes](#) [3,119]

PGSB

- [CrowsNest](#) [13,324]

CIMMYT

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Examples: yield, fhb

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CFD2



cfid2

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Species

Triticum [1]

Data type

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OpenMinTeD@GnpIS [1]

Data provider

INRAE-URGI [1]

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[10.1007/s00122-012-1838-2](#) - OpenMinTeD@GnpIS

Bibliography **Triticum**

Bibliography OpenMinTeD 10.1007/s00122-012-1838-2 Mapping QTL for resistance to eyespot of <span class='openminted_taxon' [...] 415, and **cfid2** are tightly linked to Q.<span class='ope ... (Expand)

[JDI0WSE_C0114A_7333656_7333940_CFD_SSR_TRIMMED](#) - IWGSC@GnpIS

Gene annotation **Triticum aestivum**

SEQUENCE FEATURE IWGSC@GnpIS_chr4A_7333656_7333940_CFD_SSR_TRIMMED Start = 7333656 , End = 7333940 , Strand = 0 , Source = ePCR , Seq_id = chr4A , Size = 283 , Marker = **CFD2** , Id = **CFD2** , Type = similarity , Motif = ca(11) Triticum aestivum similarity chr4 ... (Expand)

[10.1007/s00122-012-1838-2](#) - OpenMinTeD@GnpIS

Bibliography **Triticum**

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Intersection
(AND query)



Triticum aestivum (IWGSC)

Location: 2A:100,113,981-100,117,432 Gene: TraesCS2A02G151900 Trans: TraesCS2A02G151900.1

- Gene-based displays**
- Summary
 - Splice variants
 - Transcript comparison
 - Gene alleles
 - Sequence
 - Secondary Structure
 - Gene families
 - Literature
 - Plant Comparison
 - Genomic alignments
 - Gene tree
 - Gene gain/loss tree
 - Orthologues
 - Paralogues
 - Homoeologues
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 - Gene Tree
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 - Ontologies
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 - GO: Cellular component
 - GO: Molecular function
 - Phenotypes
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 - Pathway
 - Regulation
 - External references
 - Supporting evidence
 - ID History
 - Gene history

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[Ensembl Plants is produced in collaboration with Gramene](#)

Gene: TraesCS2A02G151900

Description Uncharacterized protein At3g57150 (Fragment) [Source:Projected from Arabidopsis thaliana (AT3G57150) UniProtKB/TrEMBL;Acc:C0SVF3]

Location [Chromosome 2A: 100,113,981-100,117,432](#) forward strand.

About this gene This gene has 1 transcript ([splice variant](#)) and [144 orthologues](#).

Transcripts [Show transcript table](#)

Summary

Gene type Protein coding

Annotation method Genes annotated with high confidence by IWGSC

Go to [Region in Detail](#) for more tracks and navigation options (e.g. zooming)



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Original Paper | Published: 11 March 2012

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Hongyan Sheng, Deven B. See & Timothy D. Murray

Theoretical and Applied Genetics **125**, 355–366(2012) | [Cite this article](#)

402 Accesses | 14 Citations

Abstract

Eyespot is an economically important disease of wheat caused by the soilborne fungi *Oculimacula yallundae* and *O. acuformis*. These pathogens infect and colonize the stem base, which results in lodging of diseased plants and reduced grain yield. Disease resistant cultivars are the most desirable control method, but resistance genes are limited in the wheat gene pool. Some accessions of the wheat wild relative *Aegilops longissima* are resistant to eyespot, but nothing is known about the genetic control of resistance. A recombinant inbred line population was developed from the cross PI 542196 (R) × PI 330486 (S) to map the resistance genes and better understand resistance in *Ae. longissima*. A genetic linkage map of the S¹ genome was constructed with 169 wheat microsatellite markers covering 1261.3 cM in 7 groups. F₂ lines (189) were tested for reaction to *O. yallundae* and four QTL were detected in chromosomes 1S¹, 3S¹, 5S¹, and 7S¹. These QTL explained 44 % of the total phenotypic variation in reaction to eyespot based on GUS scores and 63 % for visual disease ratings. These results demonstrate that genetic control of *O. yallundae* resistance in *Ae. longissima* is polygenic. This is the first report of multiple QTL conferring resistance to eyespot in *Ae. longissima*. Markers *cd16*, *umc202*, *umc215*, and *cd18* are tightly linked to *O. yallundae* S¹

CFD2 - IWGSC@GnpIS

Genome annotation **Triticum aestivum**

Genome annotation IWGSC@GnpIS **CFD2 CFD2** is a similarity:ePCR_cfd of Triticum aestivum located between positions 14028 and 14311 on 4AS_v2_5981297 and which properties are Size=283,Motif=gt(9),load_id=CFD2_147 Triticum aestivum similarity

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Sections

Figures

References

Abstract

References

Yield



Ho



TRIUR3_07354 *Triticum urartu*

Putative deoxyribonuclease TATDN1

Zm00001d007881 *Zea mays*

TatD related DNase

Model Species Homolog

Location Homology X-refs

Compara Gene Tree

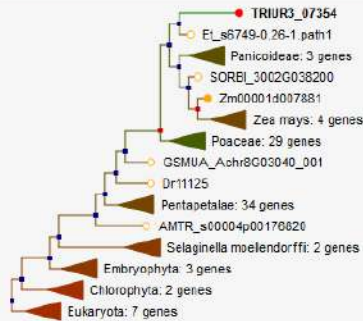


Search for genes, species, pathways, ontology terms, domains...



1 genes in 1 genomes

Gene | TRIUR3_07354



Search Gramene

Show All Homologs 91

Show Orthologs 89



Links to other resources

Ensembl Gene Tree view

Data

- Inte
- Ger
- Go
- Inte
- Inte
- Go
- Inte

Data

- Gra

Data

- INR
- CIM
- Gra
- Rot
- Gra
- T3
- Sou
- IPK
- IPG

Release Notes (62) About Cite Feedback Privacy

Gramene is a collaborative effort among Cold Spring Harbor Laboratory, Oregon State University, and EMBL-EBI.

Funding is provided by the NSF and USDA ARS.

Application Info

- Data Release 62
- Gramene Search UI LOCAL DEVELOPMENT BUILD
- Built on January 14th 2020 at 1:01:57 pm

Actions

Reset Gramene Search

New features: ontology annotation

- ❑ Link literature with experimental data (genotyping, phenotyping...) using ontology annotation
- ❑ Corpus of ~1600 wheat open access publications
- ❑ Text mining ontology: Wheat Trait Ontology
<http://wheat.agroportal.lirmm.fr/ontologies/WHEATPHENOTYPE>
- ❑ Semantic facet filtering

New features: URL derefeencing

All search parameters and filters are available in the URL for later direct reference, ie.:

<https://urgi.versailles.inrae.fr/wheatis/search?query=yield&node=Gramene&entry=Gene&species=Triticum%20urartu>

New features: synonym enrichment



Home WheatIS website Wheat@URGI More... ▾

einkorn wheat

Search

Species (290)

Filter on Species...

Data type (20)

Filter on Data type...

Database (17)

Filter on Database...

Data provider

- UWA [167 167]
- INRAE-URGI [12 224]
- GrainGenes [8 008]
- IPK [6 706]
- CIMMYT [1 696]
- T3 [1 353]
- Rothamsted Research [63]
- Gramene [4]
- IPGPAS [1]

Results 1 to 20 from 197 222 (limited to 10 000)

Marquis*4/2/Stewart*3/Triticum monococcum - GrainGenes

Germplasm **Triticum aestivum**

Germplasm GrainGenes Marquis*4/2/Stewart*3/**Triticum monococcum** Unknown Germplasm Type. Marquis*4/2/Stewart*3/**Triticum monococcum** Triticum aestivum ... (Expand)

2006380 - GEBIS

Triticum monococcum l

2006380 genbank_passport_data GEBIS **Triticum monococcum** L. ACCESSION NUMBER: TRI 29537; BOTANICAL NAME: **Triticum monococcum** L.; OTHER NAMES: Albin; ANNUALITY: spring type; SAMPLE STATUS:

Advanced/improved cultivar; COUNTRY OF ORIGIN: Germany; ... (Expand)

617 - GEBIS

Triticum monococcum l. var. vulgare körn

617 genbank_passport_data GEBIS **Triticum monococcum** L. var. vulgare Körn ACCESSION NUMBER: TRI 617; BOTANICAL NAME: **Triticum monococcum** L. var. vulgare Körn.; ANNUALITY: spring type; SAMPLE STATUS: Traditional cultivar/landrace; COUNTRY OF ORIGIN: Albania; ... (Expand)

2009 - GEBIS

Triticum monococcum l. var. macedonicum papag

2009 genbank_passport_data GEBIS **Triticum monococcum** L. var. macedonicum Papag ACCESSION NUMBER: TRI 2009; BOTANICAL NAME: **Triticum monococcum** L. var. macedonicum Papag.; ANNUALITY: spring type; SAMPLE STATUS: Traditional cultivar/landrace; COUNTRY OF ORIGIN: ... (Expand)

644 - GEBIS

Triticum monococcum l. var. vulgare körn

644 genbank_passport_data GEBIS **Triticum monococcum** L. var. vulgare Körn ACCESSION NUMBER: TRI 644; BOTANICAL NAME: **Triticum monococcum** L. var. vulgare Körn.; ANNUALITY: spring type; SAMPLE STATUS: Traditional

New features: addition of BrAPI sources

The screenshot shows the WheatIS DataDiscovery website interface. The header includes the WheatIS logo and navigation links. The main content area is titled 'Data providers' and lists various sources. A search bar is visible on the right. Red arrows highlight the BrAPI data sources.

Data providers

- INRAE-URGI**
 - IWGSC@GnpIS [19,195,264]
 - GnpIS [631,498]
 - brapi@INRAE-URGI [15,949]
 - OpenMinTeD@GnpIS [1,692]
 - WheatIS File Repository [6]
- EBI**
 - Ensembl Plants [3,071,189]
- IPK**
 - CR-EST [199,220]
 - GEBIS [51,820]
 - MetaCrop [355]
- Gramene**
 - Gramene [229,851]
- T3**
 - The Triticeae Toolbox [206,406]
 - UniProt by T3 [16,607]
- UWA**
 - Wheat Pangenome [167,167]
- Rothamsted Research**
 - KnetMiner [108,474]
- GrainGenes**
 - GrainGenes [20,190]
 - Komugi wheat gene catalog by GrainGenes [3,119]
- PGSB**
 - CrowsNest [13,324]
- CIMMYT**
 - CIMMYT Publications [1,600]
 - CIMMYT Datasets [183]
- EVA**
 - brapi@EVA [710]
- TERRA-REF**
 - brapi@TERRA-REF [284]
- IPGPAS**
 - PlantPhenoDB [6]

Examples: yield, fhb

BrAPI data sources

How to contribute/join



Home Wheat@URGI

More... ▾

- About
- Join us
- Terms of use
- Help
- News/Perspectives

How to join the wheat information system for the Plant federations of searchable data?

If you want your information system to be referenced, you should provide us with a [JSON](#) file with metadata only. The metadata format must follow the indications below and we invite you to [contact us](#) as soon as possible so that we can provide you with the best way to go ahead.

Note that since the tool makes a backlink to your information system, we need a URL allowing researchers to get detailed information about the indexed entry directly in your information system.

Overview of the metadata associated to each searchable entry/document

- a short *name* identifying uniquely the entry, ie. [BTH_Le_MouIon_2000_SetA](#)
- an *url* linking back to the entry in your own web application, ie. <https://urgi.versailles.inrae.fr/ephephesis/ephephesis/viewer.do#trialCard/trialId=56>
- a *description*, of the entry that contains all the relevant keywords allowing to find your entry. All the terms of this field are used by the search tool to allow users to find entries
- an *entryType* describing the type of the entry, that could be any of the terms listed in the dedicated section below
- a *species* field, containing the species related to the entry (zero, one or several, but it is highly recommended to provide at least one)
- a *node*, the name of your laboratory/institute, it should be the same for all the entities you manage
- a *databaseName*, the name of the database from which the entry has been extracted. It can differ from one entry to another if you handle several databases

Detailed specifications for the metadata fields

name

I

The value of the *name* field must be unique in your own dataset and should be clear enough to help scientists to identify at the first glance this entry among the other.

| Status | Cardinality | Constraints |
|-----------|-------------|-------------|
| Mandatory | 1 | Unique |

Perspectives

Perspectives

2023

Monitor outgoing traffic towards partner databases

This metric will trace the impact of the WheatIS data portal, hence promoting its use.

Display date of last data update

Make the data loading process smoother and display the date of the last data update in the web interface.

Long term perspectives

Extend ontology annotation

The [2020 ontology annotation feature](#) is expected to be extended to other kind of documents (any document containing a supported ontology term) as well as using other ontologies (such as [Wheat Crop ontology](#), [Plant Ontology](#) or [Wheat Trait and Phenotype Ontology](#)).

Allow search for exact phrases

Allow searching group of terms linked together, ie. "*fusarium head blight*". Currently, any of the 3 terms are searched independently, resulting in a lot of false positives.

Review the storage of data

Currently the data is stored next to the code into Git LFS. We plan to review this approach to reduce the storage cost.

Download results

Add a download feature allowing to get batch results in a tabulated and/or JSON format. Number of results to be clarified.

Add [Bioschemas.org](#) sources

Web pages resources marked with [Bioschemas.org](#) annotations will be indexed in the frame an [ELIXIR](#) infrastructure [commissioned service](#).

Beyond WheatIS: other species/communities



- ❑ ELIXIR: European Infrastructure for life science
- ❑ ELIXIR Plant Data Search Service: FAIDARE
- ❑ Data repositories federation - extends WheatIS
- ❑ FAIDARE is global, beyond Elixir

URGI - More...

FAIDARE

FAIR Data-finder for Agronomic REsearch

Examples: yield, fhb Search

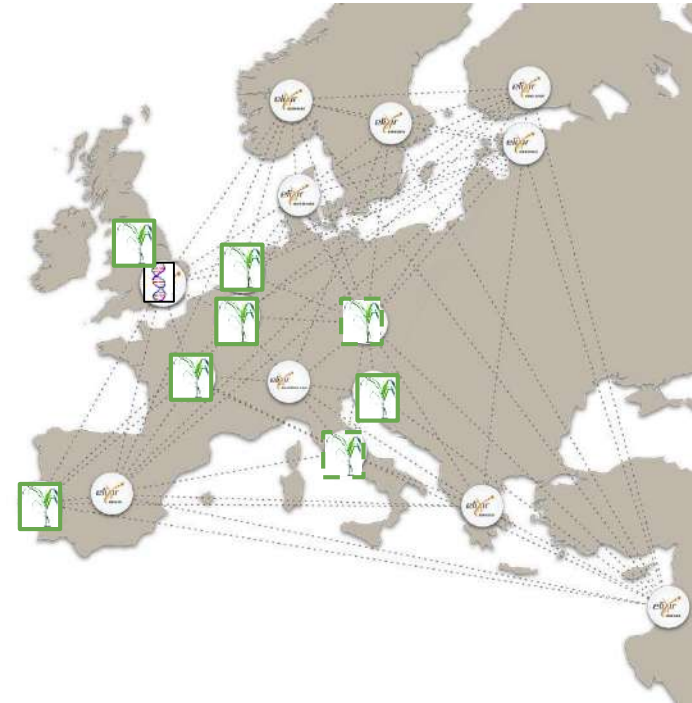
Example queries

- yield
- fhb
- University of Oulu
- metribuzin tolerance

Data providers

| | |
|--------------------|---------------------------------|
| URGI GnpIS | NIB PISA |
| WUR EU-SOL BreedDB | CIRAD TropGENE |
| VIB PIPPA | EBI European Nucleotide Archive |
| IBET BioData | TERRA-REF |

elixir



<https://urgi.versailles.inrae.fr/aidare/>

FAIDARE



URGI ▾ More... ▾

Examples: yield, fhb

Species (163)

Filter on Species...

Taxon group (1,828)

Vitis [5,015,574] ✕

Filter on Taxon group...

Data type (12)

Filter on Data type...

Collection ?

- None [5,002,747]
- Grapevine BRC [12,827]
- CRB-Vigne-Vassal [435]
- popMtp3297 (Grenache N x Syrah N) – popMtp3298 (Syrah N x Grenache N) [191]
- RlxGW120 [124]
- Panel-Assos-279-Montpellier [31]

Database

- GnpIS [4,971,976]
- Ensembl Plants [30,661]
- brapi@INRAE-URGI [12,881]
- brapi@EVA [55]
- MetaCrop [1]

Data provider

- INRAE-URGI [4,984,857]
- EBI [30,661]
- EVA [55]
- IPK [1]

Results 1 to 20 of 10,000

All **Germplasm**

BQ794645 - GnpIS

Marker **Vitis vinifera L.**

BQ794645 is a PCR marker from taxon *Vitis vinifera L.*

BQ794757 - GnpIS

Marker **Vitis vinifera L.**

BQ794757 is a PCR marker from taxon *Vitis vinifera L.*

BQ795963 - GnpIS

Marker **Vitis vinifera L.**

BQ795963 is a PCR marker from taxon *Vitis vinifera L.*

BQ797780 - GnpIS

Marker **Vitis vinifera L.**

BQ797780 is a PCR marker from taxon *Vitis vinifera L.*

BQ797840 - GnpIS

Marker **Vitis vinifera L.**

BQ797840 is a PCR marker from taxon *Vitis vinifera L.*

BQ798928 - GnpIS

Marker **Vitis vinifera L.**

BQ798928 is a PCR marker from taxon *Vitis vinifera L.*

BQ798952 - GnpIS

Marker **Vitis vinifera L.**

BQ798952 is a PCR marker from taxon *Vitis vinifera L.*

BQ799093 - GnpIS

Marker **Vitis vinifera L.**

BQ799093 is a PCR marker from taxon *Vitis vinifera L.*

BQ799904 - GnpIS

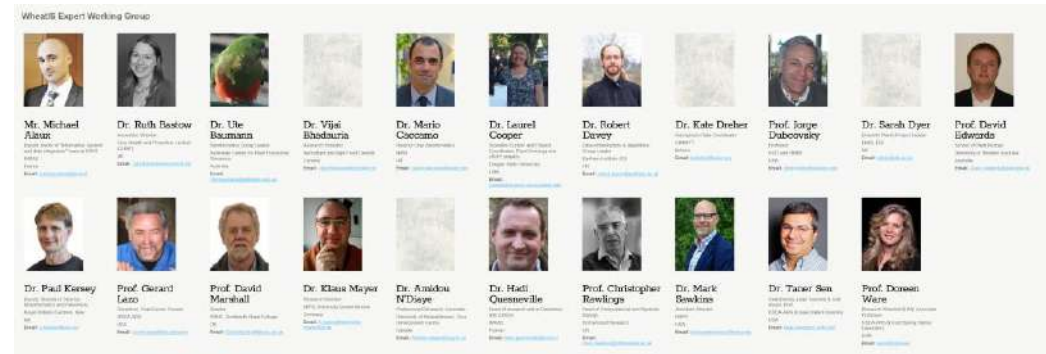
Marker **Vitis vinifera L.**

BQ799904 is a PCR marker from taxon *Vitis vinifera L.*

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Data providers



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